

REMARKS/ARGUMENTS

In the Office Action mailed January 23, 2009, claims 8-28 and 31 were rejected. In response, Applicants hereby request reconsideration of the application in view of the proposed amendments and the below-provided remarks. No claims are added or canceled. Applicants submit that the proposed amendments place the present application in condition for allowance or in better condition for appeal.

For reference, proposed amendments are submitted for claim 8. In particular, the proposed amendments for claim 8 are presented to clarify the language of the claim. These proposed amendments are supported by the original language of the claim, as well as the disclosure within the specification and drawings of the present application.

Claim Rejections under 35 U.S.C. 112

Claims 8-28 and 31 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, claim 8 was rejected for various instances of language which the Examiner identifies as vague, indefinite, and confusing. Applicants respectfully submit that the proposed amendments herein clarify the language of the claim to address the issues raised in the Office Action.

In regard to the front and back faces recited in the claim, the proposed amendments clarify that the first plane has a front face and a back face.

In regard to the bond surface recited in the claim, the proposed amendments clarify that the lead frame includes the bond surface.

In regard to the second plane recited in the claim, the proposed amendments clarify that the bond surface extends in the second plane.

In regard to the third plane recited in the claim, Applicants respectfully submit that there is no language to indicate that an axis might form the third plane. Although the claim draws a relationship between an axis (a line) and the third plane, there is no language to require that the axis might form the third plane. Nevertheless, the proposed amendments clarify that the axis of rotation extends along a line in the third plane.

Also in regard to the third plane recited in the claim, the proposed amendments clarify that all points of the third plane are both equidistant to and between the front faces of the first and second planes. For a better contextual understanding of at least one example of the position of the third plane relative to the first and second planes, it may be useful to refer to the illustrations shown in Figs. 1-3 of the present application. In those illustrations, an angle α separates the first plane 2 and the second plane 4. A third plane 6 is positioned between the first and second planes at an angle $\alpha/2$ (i.e., halfway between the first and second planes). Thus, each point on the third plane 6 is equidistant from corresponding points on the first plane 2 and the second plane 4.

In light of the proposed amendments presented herein, Applicants respectfully request that the rejections of claims 8-28 and 31 under 35 U.S.C. 112, second paragraph, be withdrawn.

Claim Rejections under 35 U.S.C. 102 and 103

Claims 8-28 and 31 were rejected under 35 U.S.C. 102(b) as being anticipated by Wirz et al. (U.S. Pat. No. 6,171,049, hereinafter Wirz). Additionally, claims 8-28 and 31 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wirz in view of Hineno et al. (U.S. Pat. No. 4,653,664, hereinafter Hineno). However, Applicants respectfully submit that these claims are patentable over Wirz and Hineno for the reasons provided below.

Independent Claim 8

Claim 8 recites “a rotatable transfer assembly comprising at least two transfer heads, a first transfer head for picking up a first chip from the wafer in a chip pick-up position, and a second transfer head for bonding a second chip to the lead frame in a chip bonding position; wherein the rotatable transfer assembly is configured to concurrently rotate the first transfer head toward the chip pick-up position and the second transfer head toward the chip bonding position” (emphasis added).

In contrast, Wirz does not disclose concurrently rotating first and second transfer heads, as indicated in the claim. Additionally, the proposed combination of Wirz and Hineno is insufficient to establish a *prima facie* rejection based on obviousness because

combining the teachings of Hinenno with the teachings of Wirz would improperly change the principle of operation of the device of Wirz.

1. Wirz does not disclose concurrently rotating a first transfer head toward a chip pick-up position and a second transfer head toward a chip bonding position.

Wirz does not disclose concurrently rotating a first transfer head toward a chip pick-up position and a second transfer head toward a chip bonding position, as recited in the claim. Wirz merely describes a transfer unit 2 which uses a reciprocating motion to transfer chips 1 from a wafer 28 in a receiving plane 3 to a transport device 30 in a dispensing plane 5. Wirz, Fig. 1; col. 3, lines 57-62. The transfer unit 2 transports the chip 1 along a 90° placing path 4 that is facilitated by a pivoting movement of a pivoting arm 24. Wirz, Fig. 1; col. 3, lines 62-67.

Figs. 7a-d of Wirz illustrate the reciprocating nature of this pivoting movement. In particular, Fig. 7a of Wirz shows a receiving head 7 which lifts a chip 1 from the wafer 28. Fig. 7a of Wirz also shows a depositing head 8 which lifts another chip 1 from an intermediate station 6 (between the wafer 28 and the transport device 30). Hence, at the time corresponding to Fig. 7a, both the receiving head 7 and the depositing head 8 lift separate chips 1 for transport.

Fig. 7b of Wirz shows the receiving head 7 and the depositing head 8 traveling in a counter-clockwise direction. In particular, the receiving head 7 travels toward the intermediate station 6 (and away from the wafer 28) to deposit the corresponding chip 1 at the intermediate station 6. Also, the depositing head 8 travels toward the transport device 30 (and away from the wafer 28) to deposit the corresponding chip 1 at the transport device 30. Hence, at the time corresponding to Fig. 7b, both the receiving head 7 and the depositing head 8 are traveling toward the transport device 30 and away from the wafer 28.

Fig. 7c of Wirz shows the receiving head 7 at the intermediate station 6 and the depositing head 8 at the transport device 30. In particular, the receiving head 7 deposits the corresponding chip 1 at the intermediate station 6, and the depositing head 8 deposits the corresponding chip 1 at the transport device 30. Hence, at the time corresponding to

Fig. 7c, both the receiving head 7 and the depositing head 8 deposit separate chips 1 at different deposit locations.

Fig. 7d of Wirz shows the receiving head 7 and the depositing head 8 traveling in a clockwise direction. In particular, the receiving head 7 travels toward the wafer 28 (and away from the transport device 30) to receive another chip 1 at the wafer 28. Also, the depositing head 8 travels toward the intermediate station 6 (and away from the transport device 30) to receive another chip 1 at the intermediate station 6. Hence, at the time corresponding to Fig. 7d, both the receiving head 7 and the depositing head 8 are traveling toward the wafer 28 and away from the transport device 30.

To the extent that the transport device 30 might be considered a chip bonding position, Wirz does not disclose concurrently rotating the tool heads 7 and 8 so that one of the tool heads moves toward the transport device 30, while the other tool head moves toward the wafer 28. Since the tool heads 7 and 8 follow a synchronized reciprocating movement between the positions shown in Figs. 7a and 7c—moving in the same direction at the same time either toward or away from the same destination—the transfer unit 2 of Wirz is incapable of concurrently rotating one of the tool heads toward the transport device and the other tool head toward the wafer. Therefore, Wirz does not disclose concurrently rotating a first transfer head toward a chip pick-up position and a second transfer head toward a chip bonding position, as recited in the claim.

For the reasons presented above, Wirz does not disclose all of the limitations of the claim because Wirz does not disclose concurrently rotating a first transfer head toward a chip pick-up position and a second transfer head toward a chip bonding position, as recited in the claim. Accordingly, Applicants respectfully assert claim 8 is patentable over Wirz because Wirz does not disclose all of the limitations of the claim.

2. The proposed combination of Wirz and Hineno is insufficient to establish a prima facie rejection based on obviousness because combining the teachings of Hineno with the teachings of Wirz would improperly change the principle of operation of the transfer unit of Wirz.

Even if the combination of Wirz and Hineno were to teach all of the limitations of the claim, the proposed combination of Wirz and Hineno is nevertheless improper to

establish a *prima facie* rejection under 35 U.S.C. 103 for the proposed language of claim 8. In asserting a combination of references as a basis for an obviousness rejection, the proposed combination or modification cannot change the principle of operation of the prior art. MPEP 2143.01(VI). Moreover, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *Id.*

Here, the combination of teachings is insufficient to establish a *prima facie* rejection for the proposed language of claim 8 because the combination of Wirz and Hineno would require a substantial change in the principle of operation of Wirz in order to remedy the lack of teaching of Wirz. As explained above, Wirz does not teach concurrently rotating a first transfer head toward a chip pick-up position and a second transfer head toward a chip bonding position. Although Hineno appears to teach an automatic mounting apparatus 10 with an index table 76 that rotates vacuum chucks 78 from a pick-up position PU to a printed circuit board 66 (Hineno, Fig. 1; col. 5, lines 31-47), changing the transfer unit 2 of Wirz to incorporate such functionality would result in a substantial change in the principle of operation of the transfer unit Wirz.

In particular, changing the transfer unit 2 of Wirz to function according to the index table 76 of Hineno would require a significant design change. The transfer unit 2 of Wirz specifically relies on a reciprocating (i.e., back and forth) movement of the tool heads 7 and 8. In fact, Wirz states that “an individual chip 1 on a placing path 4 must cover a pivoting movement of in total 90°.” Wirz, col. 3, lines 62-66 (emphasis added). In other words, the pivoting movement must be 90° total. This pivoting movement includes 3 separate movements of: 1) a 40° movement of the receiving head 7 from the wafer 28 to the intermediate station 6 (Wirz, col. 6, lines 12-18), 2) a 10° movement of the intermediate station 6 (Wirz, col. 5, lines 47-50), and 3) a 40° movement of the depositing head 8 from the intermediate station 6 to the transport device 6 (Wirz, col. 6, lines 28-34). Hence, the total pivoting movement cannot be less than 90° and cannot be more than 90°. This understanding is reinforced by the illustrations of Figs. 7a-d, which are addressed in detail above.

In contrast, the index table 76 of Hineno appears to rotate the vacuum chucks 78 in a single direction, rather than in a reciprocating motion. However, the transfer unit 2 of Wirz is not capable of moving in only a single direction because the transfer unit 2 would be unable to continue to move multiple chips 1 from the wafer 28 to the transport device 30.

Consequently, if the reciprocating movements of the transfer unit 2 of Wirz were redesigned to rotate in only a single direction, then the principle of operation of Wirz would necessarily change from reciprocating movements to circular movements. Although both arrangements use arcuate paths, generally, using movements in a single direction instead of back-and-forth movements in multiple directions is a different principle of operation and would require significant redesign of the transfer unit of Wirz. Moreover, such redesign would contradict the actual teachings of Wirz, which require a total pivoting movement of exactly 90°.

Therefore, since the combination of Wirz and Hineno would result in a change in the principle of operation of Wirz—from reciprocating movements to non-reciprocating movements—the teachings of the cited references should not be combined and, hence, are not sufficient to render the limitations of claim 8 as *prima facie* obvious. Accordingly, Applicants respectfully assert claim 8 is patentable over the combination of Wirz and Hineno because the proposed combination of Wirz and Hineno would be improper to establish a *prima facie* case of obviousness for the proposed language of the claim.

Dependent Claims

Claims 9-28 and 31 depend from and incorporate all of the limitations of independent claim 8. Applicants respectfully assert claims 9-28 and 31 are allowable based on an allowable base claim. Additionally, each of claims 9-28 and 31 may be allowable for further reasons.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the proposed amendments and the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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